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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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WASHINGTON, DC 200371526

EXAMINER

KEBEDE, BROOK

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 01/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/123,430

Applicant(s)

YATES, DONALD L.

Examiner

Brook Kebede

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11/31/03.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,6,7,9-13,15,17,18,20-23,25-27,44,52,58 and 61-77 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11,17,18,20,21,23,52,58,65,68-72 and 74-77 is/are allowed.
- 6) ☒ Claim(s) 1,6,7,9,10,15,22,25,44,61-64,66 and 67 is/are rejected.
- 7) ☒ Claim(s) 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. The amendment filed on October 31, 2003 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

Claim 1 recites the limitation “**reducing an over all volume capacity of said processing apparatus**” in lines 7-8.

Since the specification does not provide support for **reducing an over all volume capacity of said processing apparatus** as originally filed, the recited limitation introduces a new matter which was not supported by the specification. Applicant is required to cancel the new matter in the reply to this Office Action.

Claim 7 recites the limitation “processing said semiconductor wafer in wet etching bath by **continuously feeding an etching fluid; stopping the continuous feeding of etching fluid**” in lines 4-6.

Since the specification does not provide support for **continuously feeding an etching fluid** and **stopping the continuous feeding of etching fluid** as originally filed, the recited limitation introduces a new matter which was not supported by the specification. Applicant is required to cancel the new matter in the reply to this Office Action.

Claim 15 recites the limitation “reducing a volume of fluid in said semiconductor processing cleaning bath by rapidly removing an upper portion of a semiconductor processing fluid present in said bath from a processing apparatus, while said wafers are immersed in said

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bath, **by telescopically collapsing sidewalls of a vessel containing said bath to rapidly reduce an overall volume capacity of said processing apparatus**” in lines 5-9.

Since the specification does not provide support for **by telescopically collapsing sidewalls of a vessel containing said bath to rapidly reduce an overall volume capacity of said processing apparatus** as originally filed, the recited limitation introduces a new matter which was not supported by the specification. Applicant is required to cancel the new matter in the reply to this Office Action.

Claim 21 recites the limitation “**reducing a volume capacity of said wet etching vessel**” in lines 7-8.

Since the specification does not provide support for **reducing a volume capacity of said wet etching vessel** as originally filed, the recited limitation introduces a new matter which was not supported by the specification. Applicant is required to cancel the new matter in the reply to this Office Action.

Claim 44 recites the limitation “**continuously feeding said aqueous hydrofluoric acid solution to process said semiconductor wafer stopping said continuous feeding acid solution**” in lines 5-7.

Since the specification does not provide support for **continuously feeding said aqueous hydrofluoric acid solution to process said semiconductor wafer stopping said continuous feeding acid solution** as originally filed, the recited limitation introduces a new matter which was not supported by the specification. Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 7, 9, 13, 15, 21, and 44 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 7 recites the limitation “processing said semiconductor wafer in wet etching bath by **continuously feeding an etching fluid**” in lines 4-5.

Since the specification does not provide support for **continuously feeding an etching fluid** as originally filed, the recited limitation introduces a new matter which was not supported by the specification. Therefore, the claimed subject matter is not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 15 recites the limitation “reducing a volume of fluid in said semiconductor processing cleaning bath by rapidly removing an upper portion of a semiconductor processing fluid present in said bath from a processing apparatus, while said wafers are immersed in said bath, by **telescopically collapsing sidewalls of a vessel containing said bath to rapidly reduce an overall volume capacity of said processing apparatus**” in lines 5-9.

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Since the specification does not provide support for **by telescopically collapsing sidewalls of a vessel containing said bath to rapidly reduce an overall volume capacity of said processing apparatus** as originally filed, the recited limitation introduces a new matter which was not supported by the specification. Applicant is required to cancel the new matter in the reply to this Office Action. Therefore, the claimed subject matter is not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 21 recites the limitation “**reducing a volume capacity of said wet etching vessel**” in lines 7-8.

Since the specification does not provide support for **reducing a volume capacity of said wet etching vessel** as originally filed, the recited limitation introduces a new matter which was not supported by the specification. Applicant is required to cancel the new matter in the reply to this Office Action. Therefore, the claimed subject matter is not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 44 recites the limitation “**continuously feeding said aqueous hydrofluoric acid solution to process said semiconductor wafer stopping said continuous feeding acid solution**” in lines 5-7.

Since the specification does not provide support for **continuously feeding said aqueous hydrofluoric acid solution to process said semiconductor wafer stopping said continuous feeding acid solution** as originally filed, the recited limitation introduces a new matter which was not supported by the specification. Applicant is required to cancel the new matter in the

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reply to this Office Action. Therefore, the claimed subject matter is not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 9 and 13 are also rejected as being dependent of the rejected independent base claim.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 1, 6, 15, and 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation “**reducing an over all volume capacity of said processing apparatus**” in lines 7-8. However, the recited limitation lacks clarity in its meaning or scope for the following reason: It is not clear how the over all volume capacity of the processing apparatus can be reduced. Is that by redesigning the apparatus to shrink or reduce the volume of the apparatus ? Is that by using another method to shrink or reduce the size of the apparatus so that the overall volume of the apparatus can be reduced ? and etc. Hence the recited claim lacks clarity in its meaning and scope. Therefore, the claim is indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 15 recites the limitation “reducing a volume of fluid in said semiconductor processing cleaning bath by rapidly removing an upper portion of a semiconductor processing fluid present in said bath from a processing apparatus, while said wafers are immersed in said bath, **by telescopically collapsing sidewalls of a vessel containing said bath to rapidly reduce**

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an overall volume capacity of said processing apparatus” in lines 5-9. However, the recited claim lacks clarity in its meaning and scope because it is not clear how the volume the bath can be rapidly reduced by opening the sidewall of the vessel. Therefore, the claim is indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 21 recites the limitation **“reducing a volume capacity of said wet etching vessel”** in lines 7-8. However, the recited limitation lacks clarity in its meaning or scope for the following reason: It is not clear how the over all volume capacity of the vessel can be reduced. Is that by redesigning the vessel to shrink or reduce the volume of the vessel ? Is that by using another method to shrink or reduce the size of the vessel so that the overall volume of the vessel can be reduced ? and etc. Hence the recited claim lacks clarity in its meaning and scope. Therefore, the claim is indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 also rejected as being dependent of the rejected independent base claim.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1, 6, 7, 9, 14, 44, and 61 are rejected under 35 U.S.C. 102(b) as being anticipated by Nishizawa et al., (USPAT/5,275,184).

Re claim 1, Nishizawa et al. disclose a method for removing surface contaminants from air/liquid interface of a semiconductor processing bath (i.e., an etching bath) for processing semiconductor wafers the method comprising: immersing wafers in a bath of semiconductor processing fluid (see Fig. 2); processing said wafers immersed in said bath of semiconductor processing fluid contained within said processing apparatus; and reducing an overall volume capacity of semiconductor processing fluid contained in the processing apparatus by rapidly displacing an upper portion semiconductor processing fluid present in the bath while the wafers remain immersed in a lower portion of the semiconductor processing fluid in the processing apparatus to remove the surface contaminants from the air/liquid interface (see Fig. 2 and Col. 2, lines 62-67 through Col. 5, lines 1-27 and see abstract).

Re claim 6, as applied to claim 1 above, Nishizawa et al. disclose all the claimed limitations including the limitation wherein the contaminants include silica (see Fig. 2).

Re claim 7, Nishizawa et al. disclose a method for reducing the contamination on a semiconductor wafer from wet etching bath comprising: immersing the semiconductor wafer in the wet etching bath; processing the semiconductor wafer in the wet etching bath by continuously feeding an etching fluid; subsequently rapidly reducing a volume of the etching bath contained within a processing apparatus by removing a substantial portion of an upper portion of the etching fluid from the processing apparatus to reduce the overall volume of etching fluid in the processing apparatus and remove surface contaminants form an air/liquid interface of the wet etching bath while retaining the semiconductor wafer in a lower portion of

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the etching fluid contained within the processing apparatus; and subsequently removing of the wafer from the bath (see Fig. 2 and related text in Col. 2, lines 62-67 through Col. 5, lines 1-27; Col. 20, lines 7-14).

Re claim 9, as applied to claim 7 above, Nishizawa et al. disclose all the claimed limitations including the limitation wherein the upper portion of the etching fluid is removed by draining a top portion of the etching fluid from wet etching bath (see Fig. 2 and related text in Col. 7, lines 2-14).

Re claim 14, Nishizawa et al. disclose a method for removing contaminants from an air/liquid interface of a semiconductor processing bath (i.e., an etching bath) for processing semiconductor wafers the method comprising: rapidly removing an upper portion of a semiconductor processing fluid present in the bath while the wafers are in the bath by rapidly removing a wafer boat containing the semiconductor wafer from the bath to remove the surface contaminants from air/liquid interface (see Fig. 2).

Re claim 44, Nishizawa et al. disclose a method for reducing the contaminants on a silicon wafer during a wet etching process, said method comprising: immersing a wafer boat suspended on a lifting arm in an etching vessel having an aqueous hydrofluoric acid solution therein for a sufficient time to etch said silicon wafer; and rapidly removing said wafer boat from said etching vessel to remove surface contaminants residing; on the upper surface of said aqueous hydrofluoric acid solution by an upward movement of said arm, thereby causing an upper portion of said aqueous hydrofluoric acid solution to spill out of said vessel to reduce the amount of said aqueous hydrofluoric acid solution in said etching vessel(see Fig. 2, and related text in Col. 2, lines 62-67 through Col. 5, lines 1-27; Col. 20, lines 7-14; Col. 11, lines 18-20).

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Re claim 61, Nishizawa et al. disclose a method for removing surface contaminants from an air/liquid interface of a semiconductor processing bath for processing semiconductor wafers, said method comprising: immersing said semiconductor wafers in the semiconductor processing bath contained in a process apparatus; reducing a volume of said semiconductor processing bath contained within a processing the apparatus by rapidly removing an upper portion of a semiconductor processing fluid present in said processing apparatus, while said wafers are immersed in a remaining lower portion of said bath, to permit flow of said upper portion of said processing fluid out of said processing apparatus and reduce a total volume of fluid contained within said processing apparatus and thereby break eddy currents holding said surface contaminants at said air/liquid interface (see Fig. 2).

8. Claims 66 and 73 are rejected under 35 U.S.C. 102(e) as being anticipated by Kamikawa et al. (US/6,131,588).

Re claim 66, Kamikawa disclose a method for removing surface contaminants from an air/liquid interface of a semiconductor processing bath for processing semiconductor wafers, said method comprising: immersing the semiconductor wafers in a semiconductor etching bath ; and rapidly removing an upper portion of a semiconductor processing fluid present in said etching bath by rapidly removing a wafer boat containing said wafers from said bath to permit flow of said upper portion of said processing fluid and thereby break eddy currents holding said surface contaminants at said air/liquid interface (see Figs. 1-30)

Re claim 73, Kamikawa disclose a method for removing surface contaminants from an air/liquid interface of a semiconductor processing bath for processing semiconductor wafers, said method comprising: processing the semiconductor wafers in a semiconductor etching solution;

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and rapidly removing an upper portion of the semiconductor etching solution by rapidly removing a wafer boat containing said wafers from said bath to permit flow of said upper portion of said processing fluid and thereby break surface tension forces holding said surface contaminants at said air/liquid interface (see Figs. 1-30).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 10, 27, and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa et al., USPAT/5,275,184 in view of Itoh et al., USPAT/5,795,401.

Re claim 10, Nishizawa et al. teach all the limitation in the claimed limitations, as applied in claim 7, except the use of paddle to remove the fluid from the top portion of the etching process bath.

Itoh et al. disclose the use of back paddle to jet (remove) out the wash fluid during process of cleaning of semiconductor substrate (see related text in Col. 10, lines 18-48).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with paddle as taught by Itoh et al. because the use of paddle would have provided removing of contaminants from the top of the wafer etching bath.

Re claim 27, Nishizawa et al. teach all the limitation in the claimed invention, as applied in claim 26, except the use of paddle to remove the fluid from the top portion of the etching process bath.

Itoh et al. disclose the use of back paddle to jet (remove) out the wash fluid during process of cleaning of semiconductor substrate (see related text in Col. 10, lines 18-48).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with paddle as taught by Itoh et al. because the use of paddle would have provided removing of contaminants from the top of the wafer etching bath.

Re claim 62, as applied to claim 61 above, Nishizawa et al. teach all the limitation in the claimed limitations except the use of paddle to remove the fluid from the top portion of the etching process bath.

Itoh et al. disclose the use of back paddle to jet (remove) out the wash fluid during process of cleaning of semiconductor substrate (see related text in Col. 10, lines 18-48).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with paddle as taught by Itoh et al. because the use of paddle would have provided removing of contaminants from the top of the wafer etching bath.

11. Claim 63 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa et al. (USPAT/5,275,184) in view Mohindra et al. (USPAT/5,958,146).

Re claim 63, as applied to claim 61 above, Nishizawa et al. disclose all the claimed limitations except the use of valve.

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Mohindra et al. disclose the use of valve to remove during cleaning (etching) process of the semiconductor wafer (see related text in Col. 3, lines 56-60).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with a valve as taught by Mohindra et al. because the use of valve would have provided removing of contaminants from the top of the wafer etching bath when the valve opens by mechanical means.

12. Claims 12, 15, 22, 25, 64, and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa et al. (USPAT/5,275,184) in view of Hayami et al. (USPAT/5,474,616).

Re claim 12, Nishizawa et al. disclose a method of removing contaminants from a semiconductor processing cleaning bath for processing semiconductor wafers the method comprising: immersing the wafers in the semiconductor wafers in the semiconductor processing cleaning bath; and reducing a volume of fluid in the semiconductor processing cleaning bath before removing the semiconductor wafers by rapidly removing from a processing apparatus an upper portion of a semiconductor processing fluid present in the bath, while the wafers are in the bath (see Fig. 2). However, Nishizawa et al. do not disclose removing a portion of the etching fluid from upper surface of the etching bath, by hingedly releasing a door located at an upper portion of the bath.

Hayami et al. disclose removing a portion of the etching fluid from upper surface of the etching bath, by hingedly releasing a door located at an upper portion of the bath to rapidly reduce an overall volume of processing fluid contained within the processing apparatus (see Fig. 41 and 42).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with a hingedly released door as taught by Hayami et al. because the use of the door would have provided removing of contaminants from the top of the wafer etching bath when the door opened.

Re claim 15, Nishizawa et al. disclose a method of removing contaminants from a semiconductor processing cleaning bath for processing semiconductor wafers the method comprising: immersing the wafers in the semiconductor processing cleaning bath; rapidly removing an upper portion of a semiconductor processing fluid present in the bath, while the wafers are immersed in the bath from processing apparatus (see Fig. 2). However, Nishizawa et al. do not disclose removing a portion of the etching fluid from upper surface of the etching bath, by telescopically collapsing sidewalls of the vessel containing the bath.

Hayami et al. disclose removing a portion of the etching fluid from upper surface of the etching bath, by telescopically collapsing sidewalls of the vessel containing the bath to rapidly reduce an overall volume of processing fluid in the processing apparatus. (see Fig. 41 and 42).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with a hingedly released door as taught by Hayami et al. because the use of telescopically collapsing sidewalls would have provided removing of contaminants from the top of the wafer etching bath when the sidewall folded.

Re claim 22, Nishizawa et al. disclose a method for etching a semiconductor wafer the method comprising: placing and etching fluid into a wet etching vessel; placing the

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semiconductor fluid into wet etching fluid; contacting the semiconductor wafer with the etching fluid for period or time; rapidly removing a portion of the etching fluid from the upper surface of wet etching vessel while keeping the semiconductor wafer immersed in the etching fluid (see Fig. 2, and related text in Col. 2, lines 62-67 through Col. 5, lines 1-27; Col. 20, lines 7-14).

However, Nishizawa et al. do not disclose removing a portion of the etching fluid from upper surface of the etching bath, by hingedly releasing a door located at an upper portion of the bath.

Hayami et al. disclose removing a portion of the etching fluid from upper surface of the etching bath, by hingedly releasing a door located at an upper portion of the bath (see Fig. 41 and 42).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with a hingedly released door as taught by Hayami et al. because the use of the door would have provided removing of contaminants from the top of the wafer etching bath when the door opened.

Re claim 25, Nishizawa et al. disclose a method for etching a semiconductor wafer the method comprising: placing an etching fluid (i.e., an aqueous HF solution) into a wet etching vessel; immersing the semiconductor fluid into wet etching fluid; contacting the semiconductor wafer with the etching fluid for period or time; and reducing a fluid-containing volume of the wet etching vessel so as to rapidly displace a portion of the etching fluid from the upper surface of wet etching vessel at a non-constant velocity while keeping the semiconductor wafer immersed in the etching fluid (see Fig. 2, and related text in Col. 2, lines 62-67 through Col. 5, lines 1-27; Col. 20, lines 7-14). However, Nishizawa et al. do not disclose removing a portion of

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the etching fluid from upper surface of the etching bath, by telescopically collapsing sidewalls of the vessel containing the bath.

Hayami et al. disclose removing a portion of the etching fluid from upper surface of the etching bath, by telescopically collapsing sidewalls of the vessel containing the bath while the semiconductor wafer is remain in the bath immersed in the remaining portion of the etching solution.

(see Fig. 41 and 42).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with a hingedly released door as taught by Hayami et al. because the use of telescopically collapsing sidewalls would have provided removing of contaminants from the top of the wafer etching bath when the sidewall folded.

Re claim 64, as applied to claim 61 above, Nishizawa et al. disclose all the claimed limitation. However, Nishizawa et al. do not disclose removing a portion of the etching fluid from upper surface of the etching bath, by hingedly releasing a door located at an upper portion of the bath.

Hayami et al. disclose removing a portion of the etching fluid from upper surface of the etching bath, by hingedly releasing a door located at an upper portion of the bath (see Fig. 41 and 42).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with a hingedly released door as taught by Hayami et al. because the use of the door would have

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provided removing of contaminants from the top of the wafer etching bath when the door opened.

Re claim 67, as applied to claim 61 above, Nishizawa et al. disclose all the claimed limitations. However, Nishizawa et al. do not disclose removing a portion of the etching fluid from upper surface of the etching bath, by telescopically collapsing sidewalls of the vessel containing the bath.

Hayami et al. disclose removing a portion of the etching fluid from upper surface of the etching bath, by telescopically collapsing sidewalls of the vessel containing the bath.
(see Fig. 41 and 42).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with a hingedly released door as taught by Hayami et al. because the use of telescopically collapsing sidewalls would have provided removing of contaminants from the top of the wafer etching bath when the sidewall folded.

Allowable Subject Matter

13. Claims 11, 17, 18, 20, 21, 23, 52, 58, 63, 65, 68-71, 72, and 74-77 are allowed over prior art of record.

14. Claim 13 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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15. Claim 13 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, first paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Response to Arguments

16. Applicant's arguments with respect to claims 11, 13, 17, 18, 20, 21, 23, 52, 58, 65, 68-71, 72, and 74-77 have been considered but are moot in view of the allowable subject matter set forth herein above.

17. Applicant's arguments filed on October 31, 2003, i.e., with respect to claims 1, 6, 7, 9-12, 15, 22, 25, 44, 61-64, 66, and 67, have been fully considered but they are not persuasive.

With respect to claims rejection, i.e., claims 1, 6, 7, 9, 14, 44, and 61, under 35 U.S.C. § 102(b), Applicant argued that Nishizawa does not teach or suggest the method as recited in the claims.

In response to the applicant's argument, the Examiner respectfully submits that such an argument is not commensurate with the scope of the claims, in particular, as stated above. The Examiner respectfully submits that Nishizawa et al. '184 disclose all the claimed limitations as applied herein above. Prior responding applicant's argument, the Examiner respectfully submits that the **volume of the apparatus (or etching bath) as claimed** cannot be reduced it is fixed and only the cleaning (etching) solution volume can be reduced **not the apparatus volume**.

Returning back to Applicant's argument, the Examiner respectfully submits that Nishizawa et al. '184 teach the process as claimed in claims 1, 6, 7, 9, 14, 44, and 61. As shown in Fig. 2, the wafers W placed in the etching (cleaning) bath that contains dilute HF solution. At the point of entry the solution is displaced due to buoyancy when the wafer is submerged into the

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bath, and that reduces the over all volume of the etching (cleaning) solution in the bath at the point of entry. In addition, the wafers are not placed in the bath indefinitely. They are placed in the bath for shot period of time and removed to let other batch of wafers to be treated (cleaned). That also displaced some of the cleaning (etching) liquid at point of exit. The removal of the contaminants also occurs at air/liquid interference. Furthermore the instant application claimed limitations use transitional term “comprising”, which is synonymous with “including,” “containing,” or “characterized by,” is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. See, e.g., *Genentech, Inc. v. Chiron Corp.*, 112 F.3d 495, 501, 42 USPQ2d 1608, 1613 (Fed. Cir. 1997) (“Comprising” is a term of art used in claim language which means that the named elements are essential, but other elements ay be added and still form a construct within the scope of the claim.); *Moleculon Research Corp. v. CBS, Inc.*, 793 F.2d 1261, 229 USPQ 805 (Fed. Cir. 1986); *In re Baxter*, 656 F.2d 679, 686, 210 USPQ 795, 803 (CCPA 1981); *Ex parte Davis*, 80 SPQ 448, 450 (Bd. App. 1948) (“comprising” leaves “the claim open for the inclusion of unspecified ingredients even in major amounts”). Whether Nishizawa et al. continuous flow or not the instant application claimed invention is within the scope of Nishizawa et al. ‘184. Further, Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. See *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). See also *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989).

Therefore, the rejection under 35 U.S.C. § 102 is deemed proper.

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With respect to claims rejection, i.e., claims 66 and 73, under 35 U.S.C. § 102(b), Applicant argued that Kamikawa et al. does teach anticipate or render obvious method as recited in the claims. In response to the applicant's argument, the Examiner respectfully submits that such an argument is not commensurate with the scope of the claims, in particularly, as stated above. The Examiner respectfully submits that Kamikawa et al. disclose all the claimed limitations as applied herein above.

With respect to claims rejection, i.e., claims 10, 27, 62, and 69, under 35 U.S.C. § 103(a), Applicant argued that the combination of Nishizawa et al. and Itoh et al. do not teach the the method claims as recited...

In response to the applicant's argument, the Examiner respectfully submits that such an argument is not commensurate with the scope of the claims, in particularly, as stated above.

In response to applicant's argument that Itoh et al. is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, the reference is analogous to the method employed to dispense the fluid form the bath.

In addition the motivation to combine can be found form the reference. Therefore, the *prima facie* case of obviousness has been met and the rejection under 35 U.S.C. § 103 is deemed proper.

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brook Kebede whose telephone number is (703) 306-4511. **After February 4, 2004, the Examiner should be contacted at (571) 272-1862.** The examiner can normally be reached on 8-5 Monday to Friday.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

BK

January 22, 2004


Erik Christensen
Supervisory Patent Examiner
Technology Center 2800